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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/776,528	02/04/2001	Tadashi Komiyama	15.32/5685	5216

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Konrad, Raynes & Victor, LLP
Suite 210
315 South Beverly Drive
Beverly Hills, CA 90212

EXAMINER

HA, NATHAN W

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 09/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/776,528

Applicant(s)

KOMIYAMA ET AL.

Examiner

Nathan W. Ha

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 23-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 34-37 is/are allowed.
- 6) ☒ Claim(s) 1-8 and 23-32 and 38-39 is/are rejected.
- 7) ☒ Claim(s) 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3 and 7-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Kramer et al. (US 6,300,670, newly cited, hereinafter, Kramer.)

In regard to claim 1, in fig. 1E, Kramer discloses a method for manufacturing a semiconductor chip, the method comprising:

forming an electrode including layer 130 on a first surface of a semiconductor chip 116, and then digging a hole 136 on the first surface of a semiconductor chip until the electrode is exposed; see col. 4, lines 28-31. Layer 130 includes plurality of metallization layers; see col. 4, lines 11-15.

In regard to claim 2, Kramer further discloses the second surface is located opposite to the first surface, see fig. 1E.

In regard to claim 3, the layer 130 includes a plurality of layers and first layer, therefore, can be on the bottom of layer 130 and the hole contacts the first layer, see fig. 1E.

In regard to claims 7-8, a metal 140 is formed on the electrode through the hole, see fig. 1E and col. 5 and lines 5-15.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-6, 24-26, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toni et al. (US 6,114,221, previously cited, hereinafter Tonti) and in view of Kramer.

In regard to claims 4-6 and 24 Toni, in figs. 4 and 13, discloses a first chip 24, an electrode 30 and a hole therein. Tonti further discloses forming a protrusion 12 by etching a surface of a second semiconductor chip, see col. 2, lines 38-41, and thereafter forming an abutting electrode 30 on an apex section of the protrusion, and positioning the first chip 10 and the second chip 24 such that the abutting electrode is in electrical contact with the electrode.

Tonti, however, does not expressly disclose the hole that is etched through the chip to the opposite surface. Kramer, in fig. 2B, discloses a chip 1 and thereafter forming a hole 7,9, from another surface. This structure, however, provides an advantage of saving space when the chips stacked together. The through hole provides

connections to the external devices and for forming stackable integrated circuit; see Kramer's abstract.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Totni as taught by Kramer in order to obtain the advantage as mentioned above.

5. Claims 23 and 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer and Tonti, and further in view of Hoffman (US 5,805,427, previously cited.)

In regard to claims 23 and 27, the combination of Kramer and Tonti discloses all of the claimed limitations as discussed in claims 4-5, 24-26, 32 above, except forming a dielectric layer in between the substrate to prevent short circuit. It should be noted that insulation layer such as resin is normally used in the stack chip package for bonding and heat dissipation, for example, die attach layer. For instance, Hoffman, in fig. 1, discloses a stack ship package includes first substrate 16 and second substrate 28 where the second substrate being attached to the first one in a cavity by die attach layer 30.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to adapt a die attach layer in the above combination as taught by Hoffman in order to obtain the advantage as mentioned above.

In regard to claims 28-29, see Tonti's fig. 16.

In regard to claim 30, see Hoffman's fig. 1.

In regard to claim 32, see Tonti's col. 2, lines 38-42.

Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer as applied to claim 1 above and further in view of Williams et al. (US 5,051,811, newly cited, hereinafter, Williams.)

In regard to claims 38-39, Kramer discloses all of the claimed limitations as mentioned above except the materials of the metal layers such as aluminum and tungsten. It should be noted that aluminum and tungsten are widely used in metalization in semiconductor device since these metals have high conductivity and each of these metals has the characteristic of being readily oxidized when exposed to air and thus prevents the bonding at the surface. For instance, in figs. 2-3, Williams teaches an analogous device includes metal interconnection layers using aluminum and tungsten metals to prevent oxidized at the surface, see col. 2, lines 30-34.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to adapt these materials in the above prior art as taught by Williams in order to obtain the advantage as mentioned above.

Allowable Subject Matter

6. Claim 33 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. Claims 34-37 are allowed.

Response to Arguments

8. Applicant's arguments with respect to claims 1-8 and 23-37 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (703) 305-3507. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and 308-3432 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Nathan Ha
September 16, 2003


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